

# Field-Effect Modulated Electro-Osmotic Pumps for High Precision Colloid Thrusters, Phase I

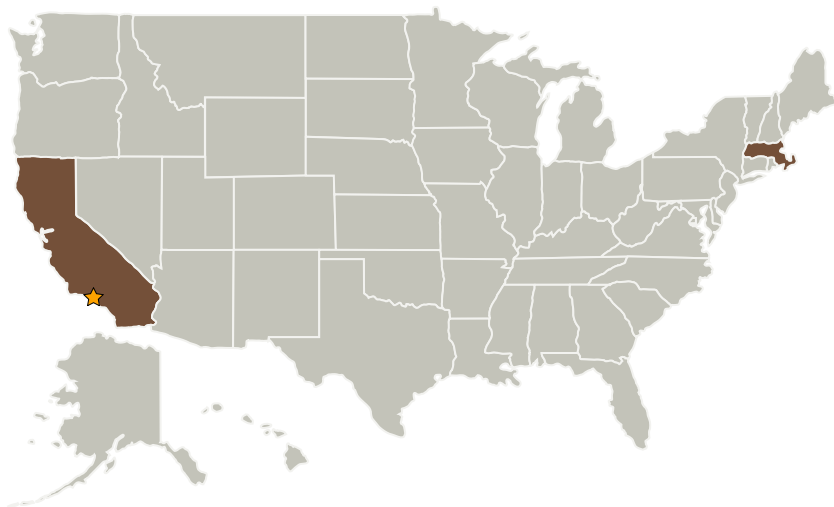
Completed Technology Project (2006 - 2006)



## Project Introduction

The ability to precisely control the position of satellites is a critical enabling technology for space missions involving interferometric arrays. One proposed mission, LISA (Laser Interferometer Space Antenna), would use an array of 3 satellites whose relative position is monitored and controlled to an accuracy of 10 nm. Precise station-keeping such as this demands precise, high stability thrusters supplied with propellant flows on the order of microliters/min and producing micro-newtons of thrust. These requirements are difficult or impossible to meet with traditional thrusters and feed systems such as cold-gas thrusters or monopropellants. The proposed program will evaluate the use of electro-osmosis to supply and control the flow of ionic liquid propellants to micronewton colloid thrusters. In addition, the use of a gate electrode to control the surface charge and therefore the magnitude and direction of flow will be examined as will the use of AC fields to limit electrolysis effects. Phase I will provide basic information on the electro-osmotic behavior of ionic liquids using simple test devices and electrospray emitters. Phase II will involve detailed design work to fabricate a practical propellant feed system using electro-osmotic pumps.

## Primary U.S. Work Locations and Key Partners



Field-Effect Modulated Electro-Osmotic Pumps for High Precision Colloid Thrusters, Phase I

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Field-Effect Modulated Electro-Osmotic Pumps for High Precision Colloid Thrusters, Phase I

Completed Technology Project (2006 - 2006)



Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Busek Company, Inc.	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Natick, Massachusetts

## Primary U.S. Work Locations

California	Massachusetts
------------	---------------

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

Carlos Torrez

## Technology Areas

## Primary:

- TX01 Propulsion Systems
  - └ TX01.1 Chemical Space Propulsion
    - └ TX01.1.1 Integrated Systems and Ancillary Technologies